***TEST IN LINEAR REGRESSION***

**The file cholesterol.xls includes the observed values of the following variables: cholesterol level, glucose, age, and Body Mass Index (ΒΜΙ), in a sample of 28 patients.**

**At the outset the results of applying linear regression modelling to these data are presented.**

**Please provide your answers after each question**

The results of SPSS fitting a simple linear model with CHOLESTEROL as depended variable and GLUCOSE as independent are:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ModelSummary** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | ,535a | ,287 | ,259 | 42,443 |
| a. Predictors: (Constant), GLUKOS | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 18814,554 | 1 | 18814,554 | 10,444 | ,003b |
| Residual | 46836,874 | 26 | 1801,418 |  |  |
| Total | 65651,429 | 27 |  |  |  |
| a. Dependent Variable: CHOLESTEROL | | | | | | |
| b. Predictors: (Constant), GLUKOS | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -4,821 | 78,904 |  | -,061 | ,952 |
| GLUKOS | 2,067 | ,639 | ,535 | 3,232 | ,003 |
| a. Dependent Variable: CHOLESTEROL | | | | | | |

1. Explain the values of the parameter estimates.

2. Access the model adequacy.

3. Explain the value of the determination coefficient

4. The 95% Confidence Intervals for the parameters of the model are:

|  |  |
| --- | --- |
| Model | |
| Lower Bound | Upper Bound |
| 1 | (Constant) | -167,011 | 157,368 |
| GLUKOS | ,752 | 3,381 |

Explain

**5.**The 95% confidence interval for the expected level of cholesterol when glucose level is 110 is (199,246). Explain it

**6.**The 95% Individual Confidence Interval for the cholesterol level which corresponds to glucose level 110 is (132, 313). Explain it

The results of SPSS fitting a Multiple Linear Regression model with cholesterol as dependent variable and two independent variables, Glucose and age, are

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ModelSummaryb** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | ,628a | ,395 | ,346 | 39,864 |
| a. Predictors: (Constant), age, GLUKOS | | | | |
| b. Dependent Variable: CHOLESTEROL | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | | | | | | | |
| Model | | | | Sum of Squares | | df | Mean Square | | F | | Sig. | |
| 1 | Regression | | | 25923,906 | | 2 | 12961,953 | | 8,157 | | ,002b | |
| Residual | | | 39727,523 | | 25 | 1589,101 | |  | |  | |
| Total | | | 65651,429 | | 27 |  | |  | |  | |
| a. Dependent Variable: CHOLESTEROL | | | | | | | | | | | | |
| b. Predictors: (Constant), age, GLUKOS | | | | | | | | | | | | |
| Model | | | Unstandardized Coefficients | | | | | Standardized Coefficients | | t | | Sig. | |
| B | | Std. Error | | | Beta | |
| 1 | | (Constant) | -47,393 | | 76,793 | | |  | | -,617 | | ,543 | |
| GLUKOS | 1,602 | | ,639 | | | ,415 | | 2,505 | | ,019 | |
| age | 1,770 | | ,837 | | | ,350 | | 2,115 | | ,045 | |

7. Explain the parameter estimates.

8. Access the adequacy of this model.

9. Explain the value of determination coefficient

10. The 95% Confidence Intervals for the parameters of the model are:

|  |  |  |  |
| --- | --- | --- | --- |
| Model | | 95,0% Confidence Interval for B | |
| Lower Bound | Upper Bound |
| 1 | (Constant) | -205,552 | 110,765 |
| GLUKOS | ,285 | 2,919 |
| age | ,047 | 3,494 |

Explain them.

**11.**The 95% confidence interval for the expected level of cholesterol when glucose is 110 and age equals 60 is (210, 260). Explain it.

**12.**The 95% Individual Confidence Interval for the cholesterol level which corresponds to glucose level 110 and age 60 years is(149, 321). Explainit

The results of SPSS fitting a Multiple Linear Regression model with cholesterol as dependent variable and three independent variables, Glucose, age, and ΒΜΙ, are

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summaryb** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | ,764a | ,584 | ,532 | 33,730 |
| a. Predictors: (Constant), BMI, age, GLUKOS | | | | |
| b. Dependent Variable: CHOLESTEROL | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 38346,722 | 3 | 12782,241 | 11,235 | ,000b |
| Residual | 27304,706 | 24 | 1137,696 |  |  |
| Total | 65651,429 | 27 |  |  |  |
| a. Dependent Variable: CHOLESTEROL | | | | | | |
| b. Predictors: (Constant), BMI, age, GLUKOS | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -185,498 | 77,257 |  | -2,401 | ,024 |
| GLUKOS | ,857 | ,586 | ,222 | 1,462 | ,157 |
| age | 1,007 | ,745 | ,199 | 1,352 | ,189 |
| BMI | 11,456 | 3,467 | ,519 | 3,304 | ,003 |

Access the adequacy of this model